

State Inference Modulation of Dopamine Reward Prediction Errors

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Submitter Benedicte Babayan
Affiliation Harvard University

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Presentation Abstract Summary It is fundamental for our daily behavior to be able to predict future outcomes and guide our actions accordingly. Reinforcement learning models have successfully accounted for such learning, relying on reward prediction errors signaled by dopamine neurons. When sensory data provide ambiguous information about the underlying state, prediction errors should reflect uncertainty about the state. Here we examine the effect of state uncertainty on dopamine responses. By training mice on an ambiguous conditioning task that makes testable predictions for state inference modulation of reward prediction errors, we show that mice infer their state based on current evidence and past experience, and that this inference modulates dopamine reward prediction errors. Our results show that dopamine responses convey teaching signals that incorporate probabilistic beliefs about the state of the world.

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Benedicte *	Babayan *	Harvard University	bbabayan@fas.harvard.edu
Naoshige	Uchida	Center for Brain Science, Department of Molecular and Cellular Biology, Harvard University	uchida@mcb.harvard.edu
Samuel	Gershman	Center for Brain Science, Department of Psychology, Harvard University	gershman@fas.harvard.edu

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